



Intermontanus

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ANNOUNCEMENTS

The Great Salt Lake Audubon Society and The BLM are cosponsoring the 12th annual Basin and Range weekend seminar June 4 and 5, 1994 at Clover Springs campground. The campground is located on the east side of Johnson Pass between Rush and Skull Valleys. The seminar brings together students of nature, lay people, and professionals for field studies in the Great Basin. Formal classes on bird watching, raptor ecology, desert birds, aquatics, human history, biodiversity, desert plants, amphibians & reptiles, and archeology will be held on Saturday and Sunday. For more information contact Jeanne Le Ber, Basin and Range Coordinator, 144 South 900 East #11, Salt Lake City, UT 84102-4162.

Dear Herpetologists;

For many years the Jamaican iguana, *Cyclura collei*, was thought to be extinct until a hunting dog captured one in 1990. The news that the Jamaican iguana still existed brought excitement to the conservation community, however this ray of hope is tempered by the continuing problems that threaten the existence of this species.

Recent surveys suggest that no more than a hundred Jamaican iguanas remain in the Hellshire Hills of Jamaica. This population is threatened by habitat destruction and predation by nonnative predators such as mongooses, feral pigs and dogs.

The newly formed Jamaican Iguana Research and Conservation Group, with support from several other organizations, including the Ft. Worth Zoo, have started an ambitious species recovery plan. Research indicates that young Jamaican iguanas are vulnerable to predators, therefore, a headstarting program is underway. About 50% of the young from wild nests are being captured and raised in captivity for four years until they reach a size that will protect them from most predators.

In addition to headstarting the young iguanas, plans are underway to build reintroduction facilities to help the captive raised animals adjust to the wild. To support these efforts habitat conservation and control of nonnative predators is necessary. Consideration is also being given to the establishment of another population on an island off the coast of Jamaica.

We need your help! The above projects require financial assistance. To help save the Jamaican Iguana you can send a contribution to the Jamaican Iguana Research and Conservation Group or you can purchase a copy of the attractive Save the Jamaican Iguana posters for \$12.50. The proceeds from the sale of the posters will support the Jamaican iguana conservation efforts.

You can purchase the posters or send contributions to;

Rick Hudson
Ft. Worth Zoo
1989 Colonial Parkway
Ft. Worth, TX 76110
(817) 871-7000

Please help ensure that the most endangered lizard in the world does not once again appear on the list of extinct species.

Sincerely,
Rick Hudson, Chair
AAZPA Lizard Advisory Group
& Assistant Herpetology Curator

BUGS, BIRDS, AND BULRUSHES! (AND MUCH MORE!) CELEBRATE UTAH'S WETLANDS

May is National Wetlands Month! The purpose of Wetlands Month is to celebrate the diversity of our nation's wetlands and increase public awareness about this vital and productive ecosystem. Events are being organized nationwide, and Utah is no exception.

The Utah Division of Wildlife Resources, in cooperation with the U.S. Fish and Wildlife Service, Utah Association of Conservation Districts, Nature Conservancy, Salt Lake Tribune and National Audubon Society, is sponsoring several activities to recognize Utah's wetlands in 1994. The theme of this year's celebration is "Bugs, birds, and bulrushes! (and much more!)"

Utah will kickoff the month long celebration with its first ever ANNUAL WETLANDS DAY! On Saturday, April 30, Utah's will have the opportunity to visit and experience wetlands at seven different locations throughout the state. Naturalists will be on-hand at each location to answer questions and distribute maps and other information. Spotting scopes will also be available to help visitors identify some of the many hundreds of migratory birds that rely on Utah's wetlands for survival. This will also be an opportunity for people to see areas of intense wildlife use not normally open to public.

The following locations will be open for visitors between 8:00 am and 5:00 PM: Ogden - Ogden Bay; Salt Lake City - Farmington Bay; Provo - Goshen Bay; Logan - Cutler Reservoir; Vernal - Ouray National Wildlife Refuge; Moab - Matheson Preserve; St. George - Virgin River (to be announced).

Maps, directions, and additional information can be obtained by calling the Division of Wildlife Resources at 538-4700.

1994 AMPHIBIAN COUNT/FIELD TRIP, 22-24 APRIL

We will take a field trip to the Uintah Basin for this year's Amphibian Count. The exact agenda has not been set yet, but we will survey some areas where amphibians have been found in the past. We will leave Salt Lake at about 6:00 PM, Friday April 22 and return on Sunday April 24. Anyone interested in going should contact Breck Bartholomew at (801) 752-0297. Hopefully we can arrange rides for people who can not (or don't want to) drive.

NEW PUBLICATIONS

Measuring and Monitoring Biological Diversity. Standard Methods for Amphibians: This essential 364 page guide is the first book to provide comprehensive coverage of standardized methods for sampling of amphibians with information on analyzing and using data that will interest biologists in general.

Nearly fifty herpetologists collaborate in describing ten standard sampling procedures. For each procedure there are recommendations for appropriate use, a detailed protocol for implementation, a list of necessary equipment and personnel, as well as suggestions for analyzing the acquired data.

These methods will be extremely useful for making comparisons among populations and species, as well as decisions about habitat protection, sustained use, and restoration-decisions particularly relevant for threatened amphibians. See book review on page 16.

Cloth: 1-56098-270-5H \$49.00, Paper: 1-56098-284-5P \$17.95. Order from the Smithsonian Institution Press, Dept. 900, Blue Ridge Summit, PA 17294-0900, USA. (Phone: 800-782-4612 or 717-794-2148).

Atlas of European Reptiles and Amphibians: The aim of the Atlas is to give the most accurate and complete picture possible of the distribution of the 60 species of Amphibians and the 120 species of Reptiles living within the geographical boundaries of this continent.

The Atlas results from an inventory started 10 years ago, and synthesizes more than 80000 datas collected by a network of specialists from all concerned countries. It also integrates data from scientific literature gathered since the beginning of the century.

Supervised by the Mapping Committee of the Societas Europaea Herpetologica, the realization of the Atlas is conducted by the Secrétariat de la Faune et de la Flore of the Muséum National d'Histoire Naturelle, Paris - France.

The book begins with an introduction on the method of collecting and processing data and then presents the main biogeographical characteristics of Europe (climate, vegetation, history of the herpetological population). This information facilitates the interpretation of the distribution maps. Each species is described in a commentary accompanied by a distribution map which indicates the confirmed presence (past or present) of the species in a system of 50 km x 50 km U.T.M. meshes. Older data (1900 to 1969), and recent one (from 1970), as well as validated introductions and extinctions are represented by specific symbols. A short chapter deals with general conservation problems for these species in their actual distribution areas. The book ends with an important bibliography grouping essential bibliographical references.

The monographs present the most recent data on the distribution of European species but also on their ecology, state of populations health and problems related to their conservation. The monographs also include synonyms, common names in the principal European languages, subspecies and the terra typica.

The maps allow for an immediate grasp of the present European distribution of each species, and for an understanding of its evolution since the beginning of the century (introductions, disappearance).

This Atlas is a reference book summarizing what there is to know about Amphibians and Reptiles in Europe.

To order send a check or international money order for 250 French Francs (about \$45) made out to Monsieur l'Agent comptable du M.N.H.N. Send to Secrétariat de la Faune et de la Flore, Muséum National d'Histoire Naturelle, 57 rue Cuvier, 75031 Paris Cedex 05, France.

READER RESPONSE

Dear Editor,

In response to the article "The Impact of the Tuacahn Development on the Gila Monster in Padre Canyon, Washington County, Utah" by Crowther (*Intermontanus* 1993. 2(6):3-6) and the subsequent reader response by Nohavec and Porras (*Intermontanus* 1994. 3(1):3-4) I offer the following comments.

Crowther indicates that development in Padre Canyon will result in the elimination of gila monsters from this area in a few years due to habitat destruction, accidental and intentional mortality and/or collection of these lizards. Crowther recommends the collection (salvage) of gila monsters in Padre Canyon for the purposes of research and relocation.

I believe Crowther's prediction of the demise of the gila monster in Padre Canyon is somewhat premature. It is highly likely that the Tuacahn project will have negative impacts on gila monsters in Padre Canyon. The extent of these impacts, however, is difficult to accurately assess. I do not believe that the viability of the gila monster population in Padre Canyon should be hastily written-off. Furthermore, I neither support nor agree with Crowther's recommendations to collect gila monsters in this area for research or relocation purposes.

I agree with Nohavec and Porras that a proactive education effort involving the general public and the organizers of the Tuacahn project may mitigate some of the negative impacts of this project.

The collection of gila monsters from Padre Canyon for research, relocation or any other reason could set a dangerous precedent for other sensitive species. This recommendation was proposed by proponents of development as a solution to conflicts with the desert tortoise in Washington County. Relocation of gila monsters is not appropriate in this situation. In addition to the reasons cited by Nohavec and Porras, relocated specimens may disturb the social structure and population dynamics of existing gila monsters at relocation sites.

After over 15 years of development in the high-density residential Bloomington Hills subdivision in St. George, gila monsters are still seen by residents. I am aware of three confirmed sightings in Spring/Summer 1993 in this area. While not conclusive, observations like these indicate that gila monsters may persist in the wake of development. Obviously, areas of open space must be provided where human activities are regulated for this species to prevail.

I favor maintaining suitable habitat, providing education and pursuing aggressive protection as alternatives to salvaging gila monsters in Southern Utah.

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Ever wonder what a species' name means? The etymology (origin of the name) for some recently described species are listed throughout this news letter in shaded boxes like this one.

FEATURES

DISTRIBUTION OF BLOTCHED TIGER SALAMANDERS IN
CACHE COUNTY, UTAH AND ADJACENT AREAS

Donald F. Smee
Utah State University
Logan, Utah 84322

Published maps indicate that the range of the blotched tiger salamander, *Ambystoma tigrinum melanostictum* includes extreme northern Utah. Bishop (1943) showed a Utah distribution of this subspecies that overlaps the range of the Arizona tiger salamander, *Ambystoma tigrinum nebulosum*. This interpretation of range and subspecies has been subsequently modified by others. Lowe (1955) defined what he considered to be a new subspecies, the Utah tiger salamander or *Ambystoma tigrinum utahensis*, which Stebbins (1966) depicted as overlapping the range of *Ambystoma tigrinum melanostictum*. The extent of the range of *Ambystoma tigrinum melanostictum* into Utah was drawn more conservative than that of Bishop (1943), however. Lowe's definition of *Ambystoma tigrinum utahensis* was based in part on his objection to the description of the subspecies *Ambystoma tigrinum nebulosum* by Dunn (1940), who indicated that young metamorphosed specimens may have yellow spots whereas older and larger metamorphosing animals develop the more typical pattern of dark spots on a dark background. The validity of the subspecies *Ambystoma tigrinum utahensis* may have lost favor over the years, such that Stebbins (1985) failed to recognize it. Stebbins continued to acknowledge the overlapping of ranges between *Ambystoma tigrinum melanostictum* and *Ambystoma tigrinum nebulosum* in northern Utah, however.

At the present time the Division of Wildlife Resources of the State of Utah (1990) recognizes only *Ambystoma tigrinum nebulosum* as a resident of the state. This suggested that adequate studies have not been conducted in northern Utah counties to firmly document populations of *Ambystoma tigrinum melanostictum* in Utah. In order to provide such information, I initiated a survey of salamanders in and near Cache County. The county is adjacent to the state of Idaho and is located in the northeastern corner of Utah. It shares the same mountain range and valley as Franklin County, Idaho immediately to the north where *Ambystoma tigrinum melanostictum* is known to occur (Nussbaum et al. 1983). For this reason it seemed natural that this salamander would also be in Cache County.

I initiated a broad search of ponds and lakes to collect and identify salamanders using a topographical map as a guide in selecting likely locations. These searches included all regions of the county in the western and eastern mountains and in the valley. Collections were made in August 1991, from March through September 1992, and June through September 1993. Most of the salamanders were obtained through the aid of colleagues and friends, who came across them while hiking, hunting, or fishing.

Because of the lack of suitable habitats, I was unable to secure specimens from most of the western and southern regions. The western region is either farm country or wetlands and the southern area consists largely of low dry mountains, much of the land being privately owned. Although high mountains form the western county boundary, these contain few ponds (devoid of salamanders except in the southwest corner). The north-central region of the county was the most productive area to collect, it being the Cache Range of the Wasatch Mountains where numerous ponds, lakes and springs occur. Besides collecting in and near Cache County, I also made a trip to the Uintah Mountains in Summit County, Utah (about 240 km south-southeast of Cache County) to collect authentic *Ambystoma tigrinum nebulosum* for comparison.

One to 12 specimens were taken per site (some locations had hundreds of salamanders and others had very few). Larvae were

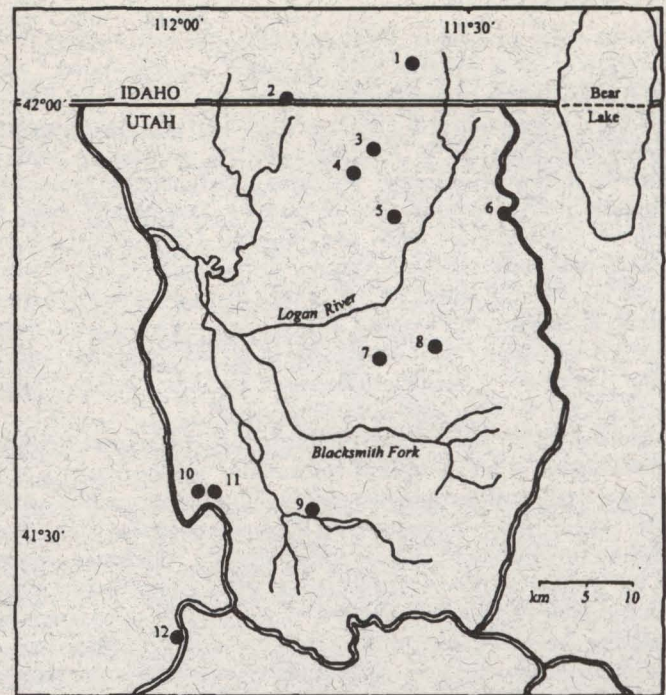


FIG 1. Map of Cache County, Utah and adjacent areas, showing collecting sites of *Ambystoma tigrinum melanostictum*. Franklin Co., Idaho locations: 1-Gibson Lakes (2620 m elevation), 3 adults, 2 larvae; 2-Skabelund Farm 2.5 km west of Franklin (1370 m), 3 adults. Cache County, Utah locations: 3-High Creek Lake (2650 m), 5 larvae; 4-Steam Mill Lake (2620 m), 12 larvae; 5-Bubble Spring (2350 m), 2 larvae; 7-Mount Logan near Adams Corral (2470 M), 5 larvae; 8-Herd Hollow 1.5 km east of crossroads (2200 m), 1 adult, 3 larvae; 9-near Porcupine Reservoir (1450 m), 1 adult, 3 larvae; 10-Dry Lake (1650 m), 6 adults; 11-Sardine Spring (1610 m), 1 adult, 2 larvae. Rich County, Utah location: 6-Burnt Fork (2500 m), 7 larvae. Box Elder County, Utah location: 12-Willard Basin (2700 m), 5 larvae.

collected from the majority of the ponds, since adults are only present in the ponds for a few weeks in the spring. The elevation at each collecting site was determined from topographical maps maintained at the Utah State University Merrill Library. Larvae were kept 1-2 months post-metamorphosis to determine body patterns. The animals were then photographed for historical documentation.

The results of the survey are presented in Figure 1. Eight of the collecting sites (locations 3-5 and 7-11) were in Cache County, two were in Franklin County, Idaho (locations 1 and 2), and one each in Rich (location 6) and Box Elder (location 11) Counties. Of these, all of the twelve collecting sites yielded *Ambystoma tigrinum melanostictum*. Each location was widely separated from the others, except locations 10 and 11 which were only about 2 km apart (by airline distance). There was a mountain range separating these two ponds, however. The other ponds and collecting areas were separated by extremes in elevations and distance, or by mountains and canyons. Thus, it is doubtful that animals migrate between the different collecting sites. Two other locations were identified that had newly hatched salamanders at the beginning of the season. But because of the drought at that time, the ponds were dried up by July before the animals reached a sufficient size to be harvested. These sites were 3 km southeast of location 5 (adjacent to the Logan River) and 1.6 km southwest of location 8.

The ground color of *Ambystoma tigrinum melanostictum* specimens was black, with the spots being yellow or yellow-brown. Spots on older animals were yellow-brown, whereas young animals had yellow spots that became darker over time. Two different spotting

patterns were present in these salamanders, and photographic examples of these patterns have appeared in publications. These patterns included irregular round spots as depicted by Bishop (1943) and Nussbaum et al. (1983), or a net-like/undulating pattern (Behler and King 1979). Animals with the net-like/undulating pattern were fewest in number, which may be a function of examining primarily newly metamorphosed animals. This pattern tends to become more evident with age (Bishop, 1943). Many of the salamanders had an unbroken yellow stripe extending from the eye to the back of the jaw. The *Ambystoma tigrinum nebulosum* from Uintah Mountains of Summit County, Utah were similar to those depicted by Bishop (1943). Nussbaum et al. (1983) reported finding a few *Ambystoma tigrinum nebulosum* in Franklin County, Idaho., although this subspecies is in the minority.

The results of this survey establish that *Ambystoma tigrinum melanostictum* is an abundant salamander subspecies in Cache County, Utah, with its range extending into adjacent counties of the state. Cache County appears to be more like southern Idaho than Utah in its environment, climate and geography, which may account for the predominance of *Ambystoma tigrinum melanostictum* there. The complete range of the subspecies can only be determined by sampling other areas farther outside of the county, but based upon this report *Ambystoma tigrinum melanostictum* should be considered a legitimate resident of northern Utah.

Acknowledgments—I wish to thank Robert Skabelund, Janis Morris, Curtis Anderson, John Gilbert, Robert Sidwell, Dale Barnard, Brett Moscon, Clinton Smith, Gary Stephens, Breck Bartholomew and Reni Stott for helping me locate or directly providing specimens from most of the locations surveyed.

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HUSBANDRY & HERPETOCULTURE

HERPETOCULTURE AND CONSERVATION: A REVIEW

By Jeff Mitchell

President, Redrock Wildlife Foundation

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This paper is a critical review of the article *Herpetoculture and Conservation* by Breck Bartholomew, published in *Intermontanus* 3(1):5-7. The purpose of this review is to show the topic as seen from a perspective which supports husbandry as a conservation tool while discussing the strengths and problems with "Herpetoculture and Conservation."

The basic purpose of *Herpetoculture and Conservation* was to examine what role, if any, herpetoculture should play in conservation. A discussion covers various topics: herpetoculturists and collection, its justification and damage, stresses of captive adaptation, and subsequent release. The paper discusses the potential problems of placing captive animals in the wild. These are: disease, parasites, and genetic tainting from inbreeding or unnatural selection. The paper comes to the conclusion that most herpetoculture is not helpful to conservation and should not be confused with it. Collection is discouraged. This review respectfully disagrees with the conclusions, but does support some policies discussed.

The paper in an over generalized way defines herpetoculturists and collectors as self-interested parties willing to destroy the environment for their own entertainment. Valid propagation programs for conservation are too narrowly defined as only those from which reintroduction or supplementation will occur. Based on these definitions, the successful breeding of animals far from their native habitat for other purposes was ignored. *Herpetoculture* is simply the breeding of reptiles and amphibians. *Collecting* is simply the act of acquiring animals from the wild. Both activities can occur without habitat destruction or damage to the natural populations, and can serve many uses including research, recreation, education, genetic population backup and commercialization of captive bred progeny.

The article implies that conservation consists of maintaining a population of animals for the population's sake and for no other purpose. In a general sense, *conservation* really means maintaining a natural population of wildlife in a healthy, stable and continuing condition. The definition does not depend upon how it is accomplished or what uses are made of the animals outside a particular population. Thus, a population is managed to maintain its integrity not only for its own sake, but also for the needs and desires of various groups such as researchers, hobbyists, educators, breeders and people who simply like to watch wildlife. Captive propagation is a valid conservation tool that allows these other uses without disturbing the natural population above its ability to handle it.

Collection, too, may be allowed in numbers that the population can adequately handle. Methods of collection which damage habitat and commercialization of wild caught animals must be prohibited. The paper over generalized when it stated "Obviously collecting is detrimental to wild populations." It should have stated, based on the examples, "Obviously, habitat destruction is detrimental to wild populations." There are areas such as Whitewater Canyon in California that sustain heavy road collecting without damage to the population, nor has habitat destruction occurred (K. Crowther, pers comm). The paper fails to mention that road collected snakes are not wasted like flattened snakes.

This paper implies that herpetoculturists and others do not have valid reasons for opposing rules prohibiting collection, possession, propagation, importation and commercialization. This is not true.

Norops pijolense—The name *pijolense* refers to the type and only known locality for the species, Pico Pijol, Honduras. The intended pronunciation of the word *pijol* is the Spanish usage (i = ee in English, j = h in English). Mcranie et al. 1993. J. Herpetol. 27(4): 393-99.

The paper implies that protection is needed for the animals in question and that the method of protection, i.e., prohibition, is effective. Those who oppose certain rules, myself included, do so because the rules are unjustified, illegal, ineffective or worst of all, counterproductive. Prohibitions on collection exist on certain native animals whose populations can handle the impact. Many species are additionally protected by their secretive habits or inaccessible habitat. Prohibitions also exist on the possession and commercialization of specific species of captive bred animals legally acquired in other states. These rules do not help the natural population in any way, and serve to block the enjoyment or research of these animals. Because the rules are not justified, they are also illegal. The agencies may only promulgate rules supported by fact (UCA 23-14-3). The paper omitted these issues.

The phrase in the paper "err on the side of conservation" is an oxymoron. If agencies do not have data and facts, they obviously cannot know that what they are doing is or is not beneficial to wildlife. The paper ridiculed certain classes of people for ignorant conservation practices, while congratulating agencies who do the same sort of thing. The herpetoculturists and others have many valid and informed arguments against current rules and policies of full prohibition, which the paper omitted.

Prohibition attracts those who want what they cannot legally have. Some animals have little attraction if it were not for prohibition. Prohibition does not protect animals from development or habitat destruction unrelated to collecting. The artificial scarcity creates demand that results in high prices, which in turn create incentives for poaching. Prohibition does not meet the needs and desires of public recreation. This in turn generates hostility and antagonism from those who would like to enjoy these animals outside their natural habitat. For determined people, poaching is currently the only way to obtain these animals when propagation and subsequent commercialization of progeny are prohibited. Prohibition wastes money enforcing unnecessary rules for animals whose population can support collecting. Complete prohibition eliminates any possibility of a backup gene pool even if it were scientifically selected and managed. Prohibition does not have an upside. The population stays the same or declines because of development, poaching, pollution or other causes. Declining populations are the norm. Prohibition does not necessarily equate with protection.

The opposition to certain rules also stems from the fact that they are illegal. If the public has to obey the law, the agencies must obey the law. They must have facts (UCA 23-14-3), and they must provide animals for public recreation and food supply and provide an adequate and proper supply of same (UCA 23-14-18). Otherwise, the agencies are not any better at obeying the law than poachers. It is proper to stop illegal activity regardless of who commits it.

If I had gone to Padre Canyon and taken the number of Gila Monsters impacted by the Tuacahn development (10 percent by DWR estimate, 50-100 percent by Redrock Wildlife Foundation estimate), or whatever that number really turns out to be, I would be immediately cited and enforcement action taken. The line "I am erring on the side of conservation" would not help me and the impacted animals would be simply wasted.

In some circles, collection and possession is considered a moral evil. William Geer, a previous Utah Division of Wildlife Resources director, said that if he could, he would prohibit any possession of wildlife whether it was captive bred or not. These people "protect" wildlife in deference to their agenda that wildlife not be subject to captivity, and not because of any threat to populations. The paper did not mention that agencies may have hidden agendas that show up as prohibition rules. Additionally, some environmentalist groups would rather have a species become extinct than have a captive breeding program. This occurred with the California Condor. If the state of California and the federal U.S.F.W.S. had not taken action anyway in spite of Audubon Society and Sierra Club opposition, the condor would now be extinct. Because of captive propagation, it is

now being reintroduced in the wild.

For most hobbyists, genetic integrity did not use to be a big issue. Where the originals came from was not as important as it would have been for a backup gene pool. However, this is changing. Herpetoculturists are more concerned about location data and genetic integrity than in the past, but it is not considered critical if the animals are not being used for serious scientific study or use. Collecting would be unnecessary for a gene pool were it not for the fact that most captives have no guarantee as to location caught.

The paper did not mention that captive propagation would not eliminate all illegal take. It would only reduce it. Most people desire animals legally obtained because of inherent advantages of captive bred animals and risk avoidance. The financial strain of legal defenses and penalties for illegal activities make legal purchase the best choice. Thus, people are willing to pay premium prices for legal animals. And legal documented animals are not usually the subject of sting operations.

My experience with pricing structure is this, if no legal population exists, prices will be high due to demand coupled with scarce supply. If captive animals are available, the captive animals will have premium pricing reflecting their documentation and legitimacy. When delisting of a species occurs a price spike upward will result in the short term from pent up demand, lowering later as supply catches up with demand. Later, the price will be in equilibrium, tending lower over time as more people possess and breed them or if interest wanes. From my experience of price lists, the albino California Kingsnake has followed this pattern. The normal California Kingsnake did not quite follow this pattern: it dropped in price, probably because captive breeding was allowed before commercialization of the baby snakes was legalized. Again, the paper did not discuss the economics of illegal collection, nor those of captive propagation. Making the transition from complete prohibition to limited collection, captive breeding and commercialization of progeny is possible in an integrated conservation plan that works.

The paper suggests that hobbyists stop collecting and put total reliance on captive produced animals. This is difficult if the captive bred animals are made illegal too. Rumor has it that the DWR is going to fully prohibit California Kingsnakes again in its 1994 proclamation covering reptiles and amphibians (B. Bartholomew, pers. comm.). If the research shows that the Utah Mountain Kingsnake is not a separate subspecies from the Arizona Mountain Kingsnake, that species will become totally prohibited as well. This is already the case with several animals that are legally obtainable out of state such as the Utah Mountain Kingsnake, Utah Milksnake, Utah Banded Gecko and others that have populations in Utah. And getting captive bred animals is totally impossible if captive breeding for a particular species does not currently exist.

On the subject of introduction and supplementation, I agree with the paper that these should be done only in an emergency. The examples the paper uses, however, do not justify this conclusion. The ibex problem occurred from introduction of a different subspecies with different habits and one rattlesnake does not a study make. While the behavior of the rattlesnake is bizarre, there can be multiple variables causing the problem having nothing to do with the origin of the rattlesnake. A study using sufficient numbers and a control population might better answer this question.

The issue of inbreeding implies a captive population that is not adequately maintained or sized. There are several reasons why this might happen. Captive populations are sometimes restricted by legal limits. Utah has captive breeding permits for controlled animals, but only allows five to be collected and a total possession limit of twenty five. No breeding with other animals of the same kind held under another permit is allowed. This makes it impossible to have the proper genetic diversity for a true gene pool. It does not seem appropriate for the paper to criticize breeders for inbreeding that

may be mandated by an agency. Backcrossing for genetic research or for spectacular color patterns is another reason inbreeding occurs. There is nothing intrinsically wrong with inbreeding reptiles or amphibians. Most captive bred animals are produced to satisfy demand of some interest group and not for reintroduction to the wild.

Currently, Utah agencies have no captive gene pool for any species of reptile or amphibian that I am aware of. If any animals with inbred characteristics had to be used for repatriation or reintroduction, it would stem from a state agency's lack of a bona fide genetic population of that species. These agencies are opposed to having programs that handle the problems brought up in the paper. The paper also omits the fact that animals with spotty populations are sometimes subject to high natural inbreeding. It would have been appropriate to contrast the difference in effect as compared to captive inbreeding problems, and what ramifications that might have on the species.

The paper also ignores introductions that have worked. Utah's mountains and streams are filled with non-native wildlife put there by state agencies for the benefit of sportsmen. It is likely that they mixed several different populations of animals from the country of origin to have sufficient genetic variety to be successful. Additionally the potential problems of captives readapting to the wild is overrated. The stresses of leaving a natural environment result from at least two different pressures. The first, as mentioned in the paper, is that the new environment may not meet all of an animal's needs. The second, is that the animal may already be stressed from injury, disease or lack of food at the time of capture. This would indicate that a healthy animal being released would be entering its natural surroundings with healthy reserves to make the transition with much less stress. The successful introductions of other wildlife would suggest that readaptive problems can be handled.

In this regard, the paper does not discuss agency policy in introduction problems, but only focused on herpetoculturists doing so. The local DWR has released long term captive Utah Milksnakes back to the wild over objections about potential disease problems (the author's study snakes), Utah Milksnakes in poor health belonging to another individual (B. Bartholomew, pers. comm.); the DWR releasing a Gila Monster outside of Bloomington of unknown origin (R. Fridell, pers. comm.). By unknown origin, I mean that there was no way to tell if the animal wandered in from the wild a few blocks away or was an illegally taken animal that had been released. Based on these results, I believe the agencies are confident that disease and genetic introduction are not real problems most of the time. This, or they are wantonly reckless. To provide balance and objectivity in the paper, all the groups releasing potentially harmful genes or diseases should have been taken to task, not just the herpetoculturists. My preference is to have animals removed permanently, but I am open to relocation, infusion or reintroduction when it makes sense. In Utah, the release of any animals to the wild without DWR permission is illegal, regardless of how much time the animal spent in captivity as suggested at the conclusion of the paper.

No mention was made about captive animals escaping and endangering native wildlife by disease or inappropriate genetics. While this is unlikely, it is a consideration that was not addressed. Most hobbyists are in urban or otherwise unnatural areas and escapees and their diseases and genetics cannot survive long enough to cause a problem. Additionally, they have an economic reason to secure their facilities. No one wants to lose money. Escape from captivity is overrated as a reason to prohibit possession.

The paper accuses herpetoculturists as using conservation for self interest. The same accusation applies to wildlife agency employees and researchers. These people would cease most of their wildlife activities if they did not get paid for them. Conserving the animals ensures these people their jobs and ensures that herpetoculturists can continue their hobby and that there is a supply of interesting

animals available for many public uses. Since collection alone cannot supply the demand for a particular animal without destabilizing the native population, then some way must be found to provide animals for all parties that does not affect the population adversely. Most species have enough animals that some collection would not harm the natural population. Complete prohibition causes researchers, hobbyists and breeders to lose. Unrestricted collection would cause the native population and nature loving people to lose. It is in the interests of all parties to come to a solution that is mutually acceptable. I believe captive propagation is that solution.

Other states are allowing more propagation, particularly California. California allows propagation and permits commercialization of native California Kingsnake, Rosy Boa and Gopher snake progeny, as well as the Reticulated Gila Monster (*Heloderma suspectum suspectum*). The Reticulated Gila Monster is allowed because any legal non native species can be bred commercially. California and Arizona both allow the capture of most of their herpetofauna with exceptions for truly sensitive species. Both California and Arizona collect revenue from fishing or hunting licenses required for the activity. These successful programs were totally ignored by the paper.

If an animal population status is so sensitive as to truly require a controlled or prohibited status, then a bona fide propagation program should be set up immediately to preserve the genetics of that population and to provide for the interests of the rest of the community, especially when inadequate measures are taken to protect the habitat. Otherwise, the species should have allowances for individuals to collect them within reasonable limits and with methods not detrimental to habitat. Commercialization of progeny must be allowed to encourage people to continue the effort and to supply the demand that would otherwise turn into poaching pressures.

The paper used an unfortunately narrow view, ignoring many possibilities that can benefit reptiles in Utah or other areas. Given the facts presented in *Herpetoculture and Conservation*, the conclusions may at first seem reasonable. However, when the narrow definitions, omissions, irrelevant or unscientific examples, and over generalizations are considered in a larger context, the conclusions do not look so reasonable. Drawing such conclusions from such a limited and lopsided set of facts could be avoided by good peer review and by proponents of both sides of the issue. The real opportunity to protect, conserve and enjoy wildlife is through captive propagation programs and wildlife habitat preservation programs. Unless habitat is protected and adequate supplies of animals are made available, other so called protection schemes such as complete prohibition will ultimately fail.

Author's note — Both Jeff Mitchell and Kerry Crowther have more than 20 years experience with reptiles and breeding. Rick Fridell is a non-game biologist for the DWR.

Abronia campbelli—This species name is a noun in the genitive case, formed in honor of Jonathan A. Campbell, the foremost authority on the genus *Abronia* and on Guatemalan herpetology. The nasty temperament of these lizards when removed from the field did not influence selection of the name. Brodie and Savage 1993. *Herpetologica* 49(4):420-27.

A REPLY TO MITCHELL

By Breck Bartholomew
195 West 200 North
Logan, Utah 84321-3905

In Mitchell's review of my article *Herpetoculture and Conservation* (Intermontanus, 3(1):5-7), it appears he has misunderstood the point of my article. I will not comment on his lengthy analysis of what I left out of my article, because I had no intention of discussing the goals of wildlife agencies, wildlife laws, or even herpetoculture in general and I believe his interpretation and views on these matters are unique and not widely shared with other UTAH members. I clearly stated "the purpose of this paper is to examine if herpetoculture should play a role in conservation," in the first paragraph of my article. Based on the available information, I concluded that "private herpetoculture is not (or should not be) a conservation tool," and I went on to list several ways herpetoculturists can promote conservation. Mitchell has presented nothing to convince me that conservation can or should be undertaken by the herpetoculturist. However, he has presented a different view of conservation, one which I believe is potentially quite harmful.

For example, stating populations should be managed for the needs and desires of researchers, hobbyists, educators, breeders, and people who simply like to watch wildlife is extremely anthropocentric. Mankind does not have an inherent right to exploit the earth's fauna and flora. The existence of *Homo sapiens* has been very brief in the earth's history, but our impact will be felt long after we are extinct primarily because so many people believe they have a right to exploit the earth and its inhabitants. Arguing that the Division of Wildlife Resources (DWR) is acting illegally by protecting animals because Utah law (UCA 23-14-18) states they "must provide animals for public recreation and food supply and provide an adequate and proper supply of same," is absurd.

An example of why this is absurd, and how the DWR is acting in the best interest (i.e., erring on the side of conservation) of both Utahns and the Utah fauna, is the gila monster in Padre Canyon. After making some anecdotal observations (Crowther 1993), Mitchell and Crowther, under the guise of the Redrock Wildlife Foundation, offered to capture and relocate, or maintain in captivity, the Padre Canyon gila monsters rather than allow the gila monsters to adapt naturally to the construction in the canyon (K. Crowther, pers. comm.). Granted the population may not survive the disturbance, but in order to give them the best chance possible we should not be removing animals, especially to keep them in captive collections. Dodd and Seigel (1991, a paper anyone interested in herpetological conservation should read) state that projects like the one Mitchell and Crowther proposed "should not be used unless all parties involved are prepared to make the necessary commitment for collecting baseline data, releasing animals under appropriate circumstances, providing for follow-up studies at periodic intervals, and publishing the methodology and results of the program regardless of whether the outcome is positive or negative." Since neither Mitchell nor Crowther have the training nor experience to indicate they could commit to such a project, the DWR has made the right decision (both legally and conservationally) by declining their offer.

A couple of additional points made in Mitchell's paper that I feel should be addressed are his comment "declining populations are the norm," and his correlating the successful introduction of nonnative species with probable success of conservation release programs. If declining populations are the norm, how have reptiles survived for millions of years? How could any species survive with ever-declining populations?

Correlating introductions of nonnative species to conservation

REPTILES AND AMPHIBIANS IN CAPTIVITY

BREEDING, LONGEVITY, & INVENTORY,
CURRENT JANUARY 1, 1993.

521 pages

Compiled by Frank and Kate Slavens



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programs is the same mistake Burke (1991) made in his reply to Dodd and Seigel (1991). The introduction of a species to an area where it is not native is a form of habitat destruction and cannot be compared to conservation efforts. Introduced species often have an advantage because the ecosystem has not evolved mechanisms to control their populations, whereas native species must cope with these natural mechanisms as soon as they are released. Using Mitchell's logic, the best "conservation" plan for the gila monsters would be to introduce them into a habitat with appropriate shelter, climate, and food resources, like parts of southern Africa or Australia. Such a conservation plan might work for the gila monster, but it would be devastating to the endemic species, just as nonnative fish and mammals have had a negative impact on Utah's ecosystems.

In summary, my *Herpetoculture and Conservation* article was written specifically for those private herpetoculturists who wish to contribute to conservation efforts. I discourage private conservation efforts because, although they mean well, they are usually misinformed, underfunded, and unprepared for the tasks involved. The conservation of biodiversity is a major field of biology and conservation is best left to those organizations which are run by recognized conservation biologists¹. This does not mean herpetoculturists cannot play an important role in conservation; we most certainly can. However, projects like those mentioned by Mitchell and the Redrock Wildlife Foundation which use the guise of conservation to further their recreational use of wildlife will only prove detrimental to conservation efforts.

In his closing paragraph, Mitchell states my examples were irrelevant and unscientific, yet Mitchell did not cite a single scientific study to support his views. Are we expected to believe his views are relevant and scientific without any supporting scientific data? Neither Mitchell nor I can claim to have the answers to what role herpetoculture should play in conservation, but previous scientific studies (see Dodd and Seigel, 1991 for a review) indicate that although herpetoculture may sound like an appropriate conservation strategy there is little evidence to suggest it has worked in the past.

Literature cited

BURKE, R.L. 1991. Relocations, repatriations, and translocations of amphibians and reptiles: Taking a broader view. *Herpetologica*. 47(3):350-357.

CROWTHER, K. L. 1993. The impact of the Tuacahn development on the gila monster in Padre Canyon, Washington County, Utah. *Intermontanus* 2(6):3-6.

DODD, C.K., Jr. and R.A. SEIGEL. 1991. Relocation, Repatriation, and translocation of amphibians and reptiles: are they conservation strategies that work? *Herpetologica*. 47(3):336-350.

¹Some of the well established organizations which are involved in the conservation of amphibians and reptiles include: International Union for Conservation of Nature and Natural Resources-The World Conservation Union Species Survival Commission, Durrell Institute of Conservation and Ecology, World Wide Fund for Nature-International, Wildlife Conservation International, American Association of Zoological Parks and Aquariums, NYZS/The Wildlife Conservation Society, Chelonian Research Foundation, Chelonian Institute, Deutsche Gesellschaft für Herpetologie und Terrarienkunde, Jersey Wildlife Preservation Trust, Madagascar Fauna Captive Propagation Group, Regional Herpetological Management Team, Reptile Joint Management Group, Audubon Society, and Nature Conservancy. Most of these groups have been around for more than 20 years and are run by a large, diverse group of professional biologists. As an example, the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group consists of 137 specialists from 27 nations. In addition, many of these organizations are subdivided into specialist groups which deal with specific topics and/or organisms. The IUCN/SSC also has a Captive Breeding Specialist Group (CBSG) which is divided into several groups and subgroups many of which are specific to herps. The CBSG Reptile and Amphibian Working Group has identified more than 130 herp species and 29 complete families which are in need of conservation work, including the gila monster and the family Xantusidae both of which occur in Utah. These organizations also sponsor several meetings and workshops on conservation which involve, or are specific to, herps. All of these organizations are in need of one thing, MONEY. This is one way I believe herpetoculturists can play an important role in conservation. Often you are able to donate to specific projects, so you know you are helping herps (i.e., the Jamaican iguana, see letter on the front page). If you'd rather keep your money closer to home there are several places which could certainly use some help. For example, the National Park Service's Cooperative Park Studies Unit at Northern Arizona University is currently working on amphibians and they are beginning a project to determine the effects of relocation on wild rattlesnakes. I am certain they would put your money to very good use. In addition to financial contributions, herpetoculturists can help these organizations through volunteer work (both field help and office work, some of which can be done in your own home) and by publishing any important information you have. Feel free to contact me if you would like more information on how you can become more involved in herp conservation. It takes the cooperation of many individuals for a conservation project to succeed, and you *can* be a part of it.

Lycodon bibonius—The species epithet *bibonius* derives from the Latin *bibo*, to drink, in honor of our colleague R. I. Crombie who, often while sharing beverages, has shared his expertise and friendship without reservation with us both. Ota and Ross 1994. *Copeia* 1994(1):159-74.

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Reprinted from *Sonoran Herpetologist* 1994. 7(3):22. Published by the Tucson Herpetological Society, P.O. Box 31531, Tucson, AZ 85751-1531.

THE GENERAL CARE AND MAINTENANCE OF DAY GECKOS BY SEAN MCKEOWN

Advanced Vivarium Systems, Lakeside, California 92040, has published an important contribution to our knowledge of the husbandry and captive management of day geckos in the genus *Phelsuma*. The author's rich knowledge of the Indian Ocean herpetofauna, combined with his extensive experience in the management of captive herpetofauna, accrued over 20 years, has produced the first comprehensive work on these lizards which will serve lizard husbandrists for years to come. It is an essential reference for all who work with this beautiful and increasingly threatened genus.

All species of *Phelsuma* are listed under appendices I or II of CITES. Many are severely threatened by habitat alteration and exploitation by the pet trade. Long-term management of genetically-diverse captive populations is therefore likely to enhance the survival of many species.

The book combines characteristics of both field and laboratory guides in over 140 pages of text and photography. It provides detailed information on natural history, geographic distribution state-of-the-science husbandry and propagation techniques, and innovative vivarium design.

The author describes general care and often highly-specialize husbandry requirements in significant detail. Individual species accounts are written in standard field guide format. Comment on species-specific captive management and husbandry vary in detail based on available information. Beautifully illustrated, the book includes over 67 spectacular color photographs of rare *Phelsuma* taxa, many of which have never before been published. A strong conservation ethic is espoused throughout the book.

Author Sean McKeown is Curator of Reptiles at the Chaffee Zoo, an AZA Professional Fellow, and a member of the AZA Lizard Advisory Group. As the foremost U.S. authority on these lizards, he has produced an excellent practical reference on day gecko which also serves as a model for future publications combining natural history and captive management. I recommend it highly.

Howard E. Lawler

Curator of Herpetology and Ichthyology
Arizona-Sonora Desert Museum

MEASURING AND MONITORING BIOLOGICAL DIVERSITY. STANDARD METHODS FOR AMPHIBIANS

W. Ronald Heyer, Maureen A. Donnelly, Roy McDiarmid, Lee-Ann C. Hayek, and Mercedes S. Foster (eds.) 1994. Smithsonian Institution Press, Washington, D.C., 364 pp. This book is the first in a series of books that recommends standardized methods for measuring and monitoring biological diversity. The intended audience is quite broad and includes scientists, conservation and wildlife agencies, and college students. The ten chapters and seven appendices are: 1) Introduction, 2) Amphibian diversity and natural history: An overview, 3) Essentials of standardization and quantification, 4) Research design for quantitative amphibian studies, 5) Keys to a successful project: Associated data and planning, 6) Standard techniques for inventory and monitoring, 7) Supplemental approaches to studying amphibian biodiversity, 8) Estimating population size, 9) Analysis of amphibian biodiversity data, and 10)

Conclusions and recommendations, and 1) Handling live amphibians, 2) Techniques for marking amphibians, 3) Recording frog calls, 4) Preparing amphibians as scientific specimens, 5) Collecting tissue for biochemical analysis, 6) Vendors, and 7) Table of random numbers. The book also includes a glossary and about 600 citations.

For a book written through the cooperation of more than fifty herpetologists, the writing style is surprisingly consistent throughout the book. This can be attributed to the fine editing which leaves the book free from any noticeable errors. However, given the diversity of the audience the glossary could be a bit more inclusive. For example, Table 1. includes nidicolous larvae, but the book does not include a definition of this larval type and the reader must look up the original source. Also, on page 172 cave salamanders are referred to as troglodytic salamanders, a term most conservation managers and college students are unfamiliar with.

The ten standard techniques presented are well organized, clear, and concise. Each consists of a brief introduction, a section on the appropriate target organisms and habitat, a background of the technique, the research design, field methods involved, the personnel and materials required, appropriate data treatment and interpretation, and recommendations for its use. Mathematical and statistical equations required for the data analysis and interpretation are presented with real data and a step-by-step example of how to solve the equation. In addition to the ten standard techniques, several supplemental or untested techniques are presented.

Although it may sound like this book is dry and very technical, it's really not. It is quite easy to read and very inspiring. University professors should seriously consider using this text in field courses. The methods presented are applicable to a wide variety of organisms and anyone planning to monitor animal populations or study biological diversity should read this book. In fact anyone who just likes to tromp around in the field and take notes on the animals found would benefit from this book. Besides at about \$18.00 for the paperback you can't go wrong.

Breck Bartholomew
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REPTILES & AMPHIBIANS IN CAPTIVITY, - INVENTORY - BREEDING - LONGEVITY, current January 1, 1993 is now available. 521 pp., hardbound \$40.00, softbound \$30.00, postage \$3.00, postage overseas \$4.00. Frank Slavens, P.O. Box 30744, Seattle, WA, 98103, FAX 206 546 2912.

BREEDING, INVENTORY SURVEY everyone keeping live reptiles and amphibians is asked to contribute to this annual report. Please submit the following information current January 1st of each year. (1) inventory of your collection, list numbers and sex. (2) list all species bred during the previous year. (3) any longevity records. (4) Please print clearly, your name, address, and telephone number as you want them listed. (5) Please do respond. Send all information to: Frank Slavens, P.O. Box 30744, Seattle, WA 98103. FAX 206 546 2912.

Wanted — Utah phone directory wanted. Those of you who would like to have a directory of club members will need to submit the information since the membership records are confidential. The information needed is as follows: name, complete address, phone and your areas of herpetological interest. My entry will be as follows: Mitchell, Jeff, 1923 North 280 West, Orem UT 84057, (801) 224-3754, Propagation, Genetics, Legal issues, Conservation and Habitat Preservation. Send me your info by April 1, 1994 to be included in the first edition. Listed people will get copies.

Wanted — a source for frozen mice. I will buy 50-100 mice every couple of months. Breck Bartholomew, 195 West 200 North, Logan, Utah 84321, (801) 752-0297.

Free to Utah resident — 1.1 Great Basin gopher snakes. 2-3 year captives feeding on dead mice. In compliance with Utah law you may not have more than three Great Basin gopher snakes; recipients must comply. Breck Bartholomew, 195 West 200 North, Logan, Utah 84321, (801) 752-0297.

What type of amphibian
foot is this?



Answer: The great basin spadefoot, *Scaphiopus intermontanus*

NEXT MEETING: 6 April 1994 at 7:00 pm in room 212 of the University of Utah's Biology building. **Breck Bartholomew** will talk about **Variation in Kingsnakes, Ratsnakes and Their Allies**. After the talk we will have our second annual member's slide show. Everyone is invited to bring some slides of herps and show them off. After the talk there will be a drawing for the Herpetocultural Library Series book "*Milksnakes*" and a desert tortoise T-Shirt. Call UTAH if you need directions to the U of U biology building. See you there!



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RESEARCH UPDATE

An important paper on the effect of ultraviolet light on amphibian eggs was just published. The paper clearly links UV-B radiation to egg mortality in some Pacific Northwest amphibians. Although there are sure to be many more pieces to the amphibian decline puzzle, this will certainly prove to be an important piece. I have included the abstract for this paper along with abstracts of two papers dealing with the increase of UV-B radiation in the Northern Hemisphere.

Andrew R. Blaustein, Peter D. Hoffman, D. Grant Hokit, Joseph M. Kiesecker, Susan C. Walls, and John B. Hays 1994. UV repair and resistance to solar UV-B in amphibian eggs: A link to population declines? Proceedings of the National Academy of Sciences. 91:1791-1795.

ABSTRACT— The populations of many amphibian species, in widely scattered habitats, appear to be in severe decline; other amphibians show no such declines. There is no known single cause for the declines, but their widespread distribution suggests involvement of global agents—increased UV-B radiation, for example. We addressed the hypothesis that differential sensitivity among species to UV radiation contributes to these population declines. We focused on species-specific differences in the abilities of eggs to repair UV radiation damage to DNA and differential hatching success of embryos exposed to solar radiation at natural oviposition sites. Quantitative comparisons of activities of a key UV-damage-specific repair enzyme, photolyase, among oocytes and eggs from 10 amphibian species were reproducibly characteristic for a given species but varied >80-fold among the species. Levels of photolyase generally correlated with expected exposure of eggs to sunlight. Among the frog and toad species studied, the highest activity was shown by the Pacific treefrog (*Hyla regilla*), whose populations are not known to be in decline. The Western toad (*Bufo boreas*) and the Cascades frog (*Rana cascadae*), whose populations have declined markedly, showed significantly lower photolyase levels. In field experiments, the hatching success of embryos exposed to UV radiation was significantly greater in *H. regilla* than in *R. cascadae* and *B. boreas*. Moreover, in *R. cascadae* and *B. boreas*, hatching success was greater in regimes shielded from UV radiation compared with regimes that allowed UV radiation. These observations are thus consistent with the UV-sensitivity hypothesis.

Mario Blumthaler and Walter Ambach 1990. Indication of increasing solar ultraviolet-B radiation flux in alpine regions. Science. 248:206-208.

ABSTRACT—Measurements at the Jungfraujoch High Mountain Station (Swiss Alps, 47°N, 3576 meters above sea level) indicate that there has been a slight increase of about 1 percent per year in the flux of solar ultraviolet-B radiation (290 to 330 nanometers) since 1981. A Robertson-Berger detector was used to measure solar erythral radiation. The increase can be related to a long-term ozone depletion.

J. B. Kerr and C. T. McElroy 1993. Evidence for Large Upward Trends of Ultraviolet-B Radiation Linked to Ozone Depletion. *Science*. 262:1032-1034.

ABSTRACT—Spectral measurements of ultraviolet-B radiation made at Toronto since 1989 indicate that the intensity of light at wavelengths near 300 nanometers has increased by 35 percent per year in winter and 7 percent per year in summer. The wavelength dependence of these trends indicates that the increase is caused by the downward trend in total ozone that was measured at Toronto during the same period. The trend at wavelengths between 320 and 325 nanometers is essentially zero.